

**FACT SHEET FOR NPDES PERMIT WA0039624**  
**PIERCE COUNTY CHAMBERS CREEK WASTEWATER FACILITY**

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## **INTRODUCTION**

The Federal Clean Water Act (FCWA, 1972, and later modifications, 1977, 1981, and 1987) established water quality goals for the navigable (surface) waters of the United States. One of the mechanisms for achieving the goals of the Clean Water Act is the National Pollutant Discharge Elimination System (NPDES) permit, which is administered by the Environmental Protection Agency (EPA). The EPA has delegated responsibility to administer the NPDES permit program to the state of Washington on the basis of Chapter 90.48 Revised Code of Washington (RCW) which defines the Department of Ecology's (Department) authority and obligations in administering the wastewater discharge permit program.

The regulations adopted by the state include procedures for issuing permits [Chapter 173-220 Washington Administrative Code (WAC)], technical criteria for discharges from municipal wastewater treatment facilities (Chapter 173-221 WAC), water quality criteria for surface and ground waters (Chapters 173-201A and 200 WAC), and sediment management standards (Chapter 173-204 WAC). These regulations require that a permit be issued before discharge of wastewater to waters of the state is allowed. The regulations also establish the basis for effluent limitations and other requirements which are to be included in the permit. One of the requirements (WAC 173-220-060) for issuing a permit under the NPDES permit program is the preparation of a draft permit and an accompanying fact sheet. Public notice of the availability of the draft permit is required at least 30 days before the permit is issued (WAC 173-220-050). The fact sheet and draft permit are available for review (see Appendix A--Public Involvement of the fact sheet for more detail on the Public Notice procedures).

The fact sheet and draft permit have been reviewed by the Permittee. Errors and omissions identified in this review have been corrected before going to public notice. After the public comment period has closed, the Department will summarize the substantive comments and the response to each comment. The summary and response to comments will become part of the file on the permit and parties submitting comments will receive a copy of the Department's response. The fact sheet will not be revised. Comments and the resultant changes to the permit will be summarized in Appendix D--Response to Comments.

<b><u>GENERAL INFORMATION</u></b>	
Applicant	Pierce County, Public Works and Utilities 9850 Chambers Creek Road University Place, WA 98467-1040
Facility Name and Address	Chambers Creek Regional WWTF 10311 Chambers Creek Road University Place, WA 98467-1040
Type of Treatment:	Activated Sludge Secondary Treatment
Discharge Location	Puget Sound Latitude: 47° 11' 41.5" N Longitude: 122° 35' 2.1" W.
Water Body ID Number	25-00-02

## **BACKGROUND INFORMATION**

### *DESCRIPTION OF THE FACILITY*

#### HISTORY

Located in the City of University Place, the Chambers Creek Regional Wastewater Treatment Facility WWTF serves more than 65,000 households and 2,000 businesses in the cities of DuPont, Lakewood, Tacoma, University Place, the Town of Steilacoom, and unincorporated areas such as Parkland, Spanaway, Frederickson, and South Hill.

Ground water quality problems had been documented in the Chambers Creek Basin as early as 1939. The ground water problems were attributed to a high number of failing on-site septic systems within the urban areas of the Chambers Creek Basin. In 1970, state and local health department officials banned septic installation within the basin and design and construction of the Chambers Creek Regional Wastewater Facility began in 1977. The Pierce County sewer system became fully operational with the opening of the Chambers Creek WWTF in 1984.

The Chambers Creek Regional WWTF began operating in November 1984 with a rated capacity of 12 MGD average dry weather flow. The facility was upgraded in 1992-1995 and 1998-1999 and currently has a rated maximum month flow of 28.7 MGD.

#### COLLECTION SYSTEM STATUS

The collection system includes approximately 564 miles of pipe, 12,700 manholes, 90 main pump stations, and five odor control facilities. There are 77 pump stations that have permanent backup generators in case of power outages with six portable generators to service the remaining 13 pump stations. In addition to the 90 main pump stations the Chambers Creek WWTF is responsible for maintaining 836 residential grinder pumps in the Pierce County area.

The County has three full-time employees specifically for infiltration and inflow reduction with an approximate annual budget of \$450,000.

#### TREATMENT PROCESSES

Wastewater enters the Chambers Creek Regional Wastewater Facility through a 72-inch gravity line into an energy dissipater. From the energy dissipater flow runs to the head or diversion box and is directed to three step screens with ¼ inch spacing. There are also three rotary screens with 1/10 inch spacing available for backup.

Three step screens separate larger nonsoluble solids in the wastewater. These screens collect solids using metal plates that wastewater passes through. Debris in the wastewater collects against the plates, which step up periodically to move the debris to a conveyor belt that transports it to a washer/compactor. In the washer/compactor, organics are washed out of the screenings and returned to the treatment process. The compactor removes excess water from the remaining debris, which is conveyed to a dumpster and disposed in a sanitary landfill.

Three grit tanks use air diffusers to keep most of the solids suspended in the waste water while allowing heavier mostly inorganic matter, such as sand and grit, to settle to the bottom of the tank. The sand and grit is conveyed to a dumpster then disposed in a sanitary landfill.

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Following grit removal, wastewater passes through a 6-foot wide Parshall flume, where the amount of wastewater entering the plant is measured. After flow is measured, wastewater enters the primary influent channel, from which it is distributed among the primary clarifiers.

Six primary sedimentation tanks are placed into service by the operation staff on an as needed basis. The influent flow rate governs the number of primary sedimentation tanks operating at any time. Tanks are 114 feet long, 41.5 feet wide, with an 8.5 feet side water depth.

A flight and chain mechanism is used to collect settleable solids (primary sludge) from the bottom of the tanks. Primary sludge is pumped to gravity belt thickeners and then is pumped to the solids digesters. Floatable solids (primary scum) are pumped to a rotary fine screen at the headworks. Screenings are taken to a sanitary landfill. With settleable solids and scum removed, primary effluent flows to the first stage of secondary treatment.

Secondary treatment begins with bioselectors used to propagate the bacteria in the wastewater that are most beneficial in breaking down organics. Currently there are five bioselector basins. Each basin is divided into six sections. Baffle walls inside the basins create a series of selector and aeration cells. Four are anoxic (only enough air is added for mixing to occur so that the growth of filamentous bacteria is constrained) and two are oxic (large quantities of air are diffused through the wastewater to maximize the amount of oxygen available to the process bacteria). In each basin, some of the mixed liquor from the oxic zone is recycled to anoxic zones one and three. From the oxic cells of each bioselector basin, mixed liquor flows into the mixed liquor channel where it is conveyed to the secondary clarifiers.

Six secondary clarifiers have a diameter of 105-feet each. The two original clarifiers have a side water depth of 12 feet and mixed liquor from the bioselectors enters the original clarifiers along the outside edge. Mixed liquor to secondary clarifiers 3 and 5 flows into pipes that deliver it to the center well of the clarifiers. The two newest clarifiers, 4 and 6, constructed in 1998, are also center-fed, with an energy-dissipating inlet and flocculation feedwell; their side water depths are 17-feet.

In the secondary clarifiers, the mixed liquor or activated solids, (also referred to as biomass) is settled in a quiescent environment. The biomass that settles is drawn off the bottom and becomes return activated sludge (RAS). This mass is returned to the head end of the bioselectors. A fraction of the RAS is continuously removed to maintain the balance between the new organic material applied each day and the total mass of organisms contained within the secondary system. The material removed is referred to as waste activated sludge (WAS). The WAS is routed to thickening processes, then conveyed to the anaerobic digesters.

After it passes over weirs at the outside edge of the secondary clarifiers, treated wastewater enters a channel and moves to final disinfection.

Combined effluent from the secondary clarifiers is split between two ultraviolet (UV) light chambers each with 4 UV channels and 2 banks of UV lights per channel. The first bank of lights is used for disinfection with the second bank used as a backup in case of failure or for maintenance. UV dosage is set by the operator and is paced with the combined total primary effluent flow entering the aeration basins in service.

Disinfected effluent is discharged through two 42-inch pipes which connect into a 60-inch outfall line and diffuser that extends 780 feet offshore into the Gordon Point zone of South Puget Sound to a depth of approximately 110-feet below mean lower low water. The nominal capacity of the effluent pipeline is 100 MGD and the capacity of the outfall is 100 MGD.

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## INDUSTRIAL DISCHARGES

Only five industries qualify as major users requiring an industrial discharge permit for industrial process wastewater in the Chambers Creek Regional WWTP service area:

Boeing Corporation, Skin and Spar fabrication facility in Frederickson. The skins and spar facility is a metal finishing categorical user. The Boeing facility performs a boric acid anodizing process on aluminum airplane parts, along with cleaning and inspection. The main discharge from the facility is neutralized acidic and caustic rinse water. In 1998, Boeing was authorized to operate a metals precipitation facility, used to reduce water consumption without exceeding categorical metals limits.

Land Recovery Incorporated (LRI) Hidden Valley Landfill, discharges treated leachate from a lined landfill cell that received municipal solid waste.

James Hardie Building Products, manufacture of cement-based building material, principally a wallboard product made from cement and paper fiber. Pretreatment includes reduction of chromium and paint solids.

Frederickson Power operates a combustion turbine generator. It does not discharge a categorical wastestream, but is permitted as a minor industry for its water treatment system discharge, which includes a pH neutralization facility.

The Chambers Creek Regional Wastewater Treatment Facility is a Class IV facility and is staffed 24 hours a day by a class IV operator. The facility has ten operators which operate on 12-hour shifts.

## DISCHARGE OUTFALL

Effluent is discharged to Puget Sound through two 42-inch diameter pipes for approximately 1,300 feet. The two 42-inch lines then connect to a 60-inch diameter pipe that extends approximately 750 feet offshore lying in an East to West line to a depth of approximately 110 feet at mean lower low water. The Outfall pipe is a 60-inch diameter reinforced concrete pre-stressed pipe with a diffuser that has an effective length (first to last port) of 112 feet. The diffuser consists of eight risers with equal 16-foot on-center spacing. Risers are staggered, have an inside diameter of 44 inches, and contain a single 11.9-inch horizontal discharge port. An underwater inspection was performed on the outfall in May 2000, by Underwater Atmospheric Systems and was found to be in good condition.

## RESIDUAL SOLIDS

The treatment facilities remove solids during the treatment of the wastewater at the headworks (grit and screenings), and at the primary and secondary clarifiers, in addition to incidental solids (rags, scum, and other debris) removed as part of the routine maintenance of the equipment. Grit, rags, scum and screenings are drained and disposed of as solid waste at the local landfill.

Wastewater solids extracted from primary sedimentation and the activated sludge process are thickened by gravity belt thickeners, stabilized by anaerobic sludge digestion, and dewatered by belt filter presses. Dewatered solids from the belt press are pumped to the truck loading station. The biosolids are loaded onto trucks and transported to farmland application sites in Lewis County and to reclamation sites in Cowlitz County. Occasionally private companies compost surplus biosolids. In the future biosolids will be used as part of the restoration of the adjoining gravel pits as part of the Chambers Creek Properties Master Site Plan.

### *PERMIT STATUS*

The previous permit for this facility was issued on March 28, 1990. The previous permit placed effluent limitations on Carbonaceous Biochemical Oxygen Demand (CBOD), Total Suspended Solids (TSS), pH, and Fecal Coliform bacteria.

An application for permit renewal was submitted to the Department on September 23, 1999, and accepted by the Department on November 14, 2000.

### *SUMMARY OF COMPLIANCE WITH THE PREVIOUS PERMIT*

During the history of the previous permit, the Permittee has remained in compliance, based on Discharge Monitoring Reports (DMRs) submitted to the Department and inspections conducted by the Department.

### *WASTEWATER CHARACTERIZATION*

The concentration of pollutants in the discharge was reported in the NPDES application and in discharge monitoring reports. The effluent is characterized as follows:

**Table 1: Wastewater Effluent Characterization**

<u>Parameter</u>	<u>Concentration or Rate</u>
Flow	13.85 MGD ADWF <sup>(1)</sup> – 19.83 MGD AFMM <sup>(2)</sup>
CBOD <sub>5</sub>	5.5 mg/L annual average – 10.4 mg/L maximum monthly average
TSS	7.1 mg/L annual average – 14.9 mg/L maximum monthly average
Fecal Coliform Bacteria	64 CFU maximum month average
pH	6 SU – 7.8 SU
Temperature (Summer)	18°C avg., 20.5°C max month avg., 15.4°C min. month avg.
Total Ammonia as N	19 mg/L annual average – 30 mg/L maximum monthly average
Dissolved Oxygen	5.25 mg/L annual average

<sup>(1)</sup>ADWF = Average Dry Weather Flow

<sup>(2)</sup>AFMM = Average Flow for Maximum Month

### *SEPA COMPLIANCE*

In accordance with WAC 197-11-855(1), permit renewals by the Department with limits no less stringent than applicable state and federal standards are exempt from the State Environmental Policy Act (SEPA) process. This facility falls under this category.

### **PROPOSED PERMIT LIMITATIONS**

Federal and state regulations require that effluent limitations set forth in a NPDES permit must be either technology- or water quality-based. Technology-based limitations for municipal discharges are set by regulation [40 Code of Federal Regulations (CFR) 133, and Chapters 173-220 and 173-221 WAC]. Water quality-based limitations are based upon compliance with the Surface Water Quality Standards (Chapter 173-201A WAC), Ground Water Standards (Chapter 173-200 WAC), Sediment Quality Standards (Chapter 173-204 WAC) or the National Toxics Rule (Federal Register, Volume 57, No. 246, Tuesday, December 22, 1992.) The most stringent of these types of limits must be chosen for each of the parameters of concern. Each of these types of limits is described in more detail below.

The limits in this permit are based in part on information received in the application. The effluent constituents in the application were evaluated on a technology- and water quality-basis. The limits necessary to meet the rules and regulations of the state of Washington were determined and included in



this permit. The Department does not develop effluent limits for all pollutants that may be reported on the application as present in the effluent. Some pollutants are not treatable at the concentrations reported, are not controllable at the source, are not listed in regulation, and do not have a reasonable potential to cause a water quality violation. Effluent limits are not always developed for pollutants that may be in the discharge but not reported as present in the application. In those circumstances the permit does not authorize discharge of the non-reported pollutants. Effluent discharge conditions may change from the conditions reported in the permit application. If significant changes occur in any constituent, as described in 40 CFR 122.42(a), the Permittee is required to notify the Department. The Permittee may be in violation of the permit until the permit is modified to reflect additional discharge of pollutants.

#### *DESIGN CRITERIA*

In accordance with WAC 173-220-150 (1)(g), flows or waste loadings shall not exceed approved design criteria.

The design criteria for this treatment facility are taken from the Chambers Creek Wastewater Treatment Plant Re-Rating and Optimization Report, October 1999, prepared by Brown and Caldwell and are as follows:

**Table 2: Design Standards for Chambers Creek WWTP.**

Parameter	Design Quantity
Maximum month flow	28.7 MGD
BOD <sub>5</sub> influent concentration	242 mg/L
BOD <sub>5</sub> influent loading	57,925 lbs/day
TSS influent concentration	303 mg/L
TSS influent loading	72,525 lbs/day

#### *TECHNOLOGY-BASED EFFLUENT LIMITATIONS*

Municipal wastewater treatment plants are a category of discharger for which technology-based effluent limits have been promulgated by federal and state regulations. These effluent limitations are given in the Code of Federal Regulations (CFR) 40 CFR Part 133 (federal) and in Chapter 173-221 WAC (state). These regulations are performance standards that constitute all known available and reasonable methods of prevention, control, and treatment for municipal wastewater.

The following technology-based limits for pH, fecal coliform, BOD<sub>5</sub>, and TSS are taken from Chapter 173-221 WAC are:

**Table 3: Technology-based Limits.**

Parameter	Limit
pH:	shall be within the range of 6 to 9 standard units.
Fecal Coliform Bacteria	Monthly Geometric Mean = 200 organisms/100 mL Weekly Geometric Mean = 400 organisms/100 mL
CBOD <sub>5</sub> (concentration)	Average Monthly Limit is the most stringent of the following: - 25 mg/L - may not exceed fifteen percent (15%) of the average influent concentration Average Weekly Limit = 40 mg/L

Parameter	Limit
TSS (concentration)	Average Monthly Limit is the most stringent of the following: - 30 mg/L - may not exceed fifteen percent (15%) of the average influent concentration Average Weekly Limit = 45 mg/L
Total Residual Chlorine (concentration)	Average Monthly Limit = 0.5 mg/L Average Weekly Limit = 0.75 mg/L

The following technology-based mass limits are based on WAC 173-220-130(3)(b) and 173-221-030(11)(b).

CBOD<sub>5</sub> monthly effluent mass loadings (lbs/day) were calculated as the maximum monthly design flow (28.7 MGD) x Concentration limit (25 mg/L) x 8.34 (conversion factor) = mass limit 5,984 lbs/day.

CBOD<sub>5</sub> weekly effluent mass loadings (lbs/day) were calculated as the maximum monthly design flow (28.7 MGD) x Concentration limit (40 mg/L) x 8.34 (conversion factor) = mass limit 9,574 lbs/day.

TSS monthly effluent mass loadings (lbs/day) were calculated as the maximum monthly design flow (28.7 MGD) x Concentration limit (30 mg/L) x 8.34 (conversion factor) = mass limit 7,181 lbs/day.

TSS weekly effluent mass loadings (lbs/day) were calculated as the maximum monthly design flow (28.7 MGD) x Concentration limit (45 mg/L) x 8.34 (conversion factor) = mass limit 10,771 lbs/day.

#### *SURFACE WATER QUALITY-BASED EFFLUENT LIMITATIONS*

In order to protect existing water quality and preserve the designated beneficial uses of Washington's surface waters, WAC 173-201A-060 states that waste discharge permits shall be conditioned such that the discharge will meet established Surface Water Quality Standards. The Washington State Surface Water Quality Standards (Chapter 173-201A WAC) is a state regulation designed to protect the beneficial uses of the surface waters of the state. Water quality-based effluent limitations may be based on an individual waste load allocation (WLA) or on a WLA developed during a basin-wide total maximum daily loading study (TMDL).

#### NUMERICAL CRITERIA FOR THE PROTECTION OF AQUATIC LIFE

"Numerical" water quality criteria are numerical values set forth in the state of Washington's Water Quality Standards for Surface Waters (Chapter 173-201A WAC). They specify the levels of pollutants allowed in a receiving water while remaining protective of aquatic life. Numerical criteria set forth in the Water Quality Standards are used along with chemical and physical data for the wastewater and receiving water to derive the effluent limits in the discharge permit. When surface water quality-based limits are more stringent or potentially more stringent than technology-based limitations, they must be used in a permit.

#### NUMERICAL CRITERIA FOR THE PROTECTION OF HUMAN HEALTH

The state was issued 91 numeric water quality criteria for the protection of human health by the U.S. EPA (EPA 1992). These criteria are designed to protect humans from cancer and other disease and are primarily applicable to fish and shellfish consumption and drinking water from surface waters.

#### NARRATIVE CRITERIA

In addition to numerical criteria, "narrative" water quality criteria (WAC 173-201A-030) limit toxic, radioactive, or deleterious material concentrations below those which have the potential to adversely affect characteristic water uses, cause acute or chronic toxicity to biota, impair aesthetic values, or adversely affect human health. Narrative criteria protect the specific beneficial uses of all fresh (WAC 173-201A-130) and marine (WAC 173-201A-140) waters in the State of Washington.

#### ANTIDEGRADATION

The state of Washington's Antidegradation Policy requires that discharges into a receiving water shall not further degrade the existing water quality of the water body. In cases where the natural conditions of a receiving water are of lower quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. Similarly, when the natural conditions of a receiving water are of higher quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. More information on the state Antidegradation Policy can be obtained by referring to WAC 173-201A-070.

The Department has reviewed existing records and is unable to determine if ambient water quality is either higher or lower than the designated classification criteria given in Chapter 173-201A WAC; therefore, the Department will use the designated classification criteria for this water body in the proposed permit. The discharges authorized by this proposed permit should not cause a loss of beneficial uses.

#### CRITICAL CONDITIONS

Surface water quality-based limits are derived for the waterbody's critical condition, which represents the receiving water and waste discharge condition with the highest potential for adverse impact on the aquatic biota, human health, and existing or characteristic water body uses.

#### MIXING ZONES

The Water Quality Standards allow the Department to authorize mixing zones around a point of discharge in establishing surface water quality-based effluent limits. Both "acute" and "chronic" mixing zones may be authorized for pollutants that can have a toxic effect on the aquatic environment near the point of discharge. The concentration of pollutants at the boundary of these mixing zones may not exceed the numerical criteria for that type of zone. Mixing zones can only be authorized for discharges that are receiving all known, available, and reasonable methods of prevention, control and treatment (AKART) and in accordance with other mixing zone requirements of WAC 173-201A-100.

The National Toxics Rule (EPA, 1992) allows the chronic mixing zone to be used to meet human health criteria.

#### DESCRIPTION OF THE RECEIVING WATER

The facility discharges to Puget Sound Gordon Point Area which is designated as a Class AA (extraordinary) receiving water in the vicinity of the outfall under WAC 173-201A-140(21).

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Characteristic uses include the following: water supply (domestic, industrial, agricultural); stock watering; fish migration; fish and shellfish rearing, spawning and harvesting; wildlife habitat; primary contact recreation; sport fishing; boating and aesthetic enjoyment; commerce and navigation.

Water quality of this class shall markedly and uniformly exceed the requirements for all or substantially all uses.

**SURFACE WATER QUALITY CRITERIA**

Applicable criteria are defined in Chapter 173-201A WAC for aquatic biota. In addition, U.S. EPA has promulgated human health criteria for toxic pollutants (EPA 1992). Criteria for this receiving water are summarized below:

Fecal Coliforms	Fecal coliform organism levels shall both not exceed a geometric mean value of 14 colonies/100 mL, and not have more than 10 percent of all samples obtained for calculating the geometric mean value exceeding 43 colonies/100 mL.
Dissolved Oxygen	Dissolved oxygen shall exceed 7.0 mg/L.
Temperature	Temperature shall not exceed 13.0 °C due to human activities. When natural conditions exceed 13.0 °C, no temperature increases will be allowed which will raise the receiving water temperature by greater than 0.3 °C.
pH	pH shall be within the range 7.0 to 8.5 with a human-caused variation within a range of less than 0.2 units.
Turbidity	Turbidity shall not exceed 5 NTU over background turbidity when the background turbidity is 50 NTU or less, or have more than a 10 percent increase in turbidity when the background turbidity is more than 50 NTU.
Toxics	Toxic, radioactive, or deleterious material concentrations shall be below those which have the potential either singularly or cumulatively to adversely affect characteristic water uses, cause acute or chronic conditions to the most sensitive biota dependent upon those waters, or adversely affect public health, as determined by the department (see WAC 173-201A-040 and 173-201A-050).

**CONSIDERATION OF SURFACE WATER QUALITY-BASED LIMITS FOR NUMERIC CRITERIA**

Pollutant concentrations in the proposed discharge exceed water quality criteria with technology-based controls which the Department has determined to be AKART. A mixing zone is authorized in accordance with the geometric configuration, flow restriction, and other restrictions for mixing zones in Chapter 173-201A WAC and are defined as follows:

The dilution factors of effluent to receiving water that occur within these zones were determined at the critical condition during the outfall evaluation for the Chambers Creek Wastewater Treatment Plant Optimization Study, October 1999, prepared by Brown and Caldwell, using the PLUMES model. The dilution factors have been determined to be (from Appendix C):

	Acute	Chronic
Aquatic Life	16.7	168

Pollutants in an effluent may affect the aquatic environment near the point of discharge (near field) or at a considerable distance from the point of discharge (far field). Toxic pollutants, for example, are near-field pollutants--their adverse effects diminish rapidly with mixing in the receiving water. Conversely, a pollutant such as BOD is a far-field pollutant whose adverse effect occurs away from the discharge even after dilution has occurred. Thus, the method of calculating water quality-based effluent limits varies with the point at which the pollutant has its maximum effect.

The derivation of water quality-based limits also takes into account the variability of the pollutant concentrations in both the effluent and the receiving water.

The critical condition for the Chambers Creek WWTF discharge located in the Gordon Point zone in South Puget Sound used for this permit includes the following:

Ambient Parameter	Value used
Temperature (min.)	Summer 10.54° C – Winter 8.45° C
pH	7.99 SU – 7.54 SU
Dissolved Oxygen (min.)	Summer 6.09 mg/L – Winter 7.90 mg/L
Salinity (avg.)	Summer 28.98 ppt – Winter 28.23 ppt

BOD<sub>5</sub>--This discharge with technology-based limitations results in a small amount of BOD loading relative to the large amount of dilution occurring in the receiving water at critical conditions. Technology-based limitations will be protective of dissolved oxygen criteria in the receiving water.

Temperature--The impact of the discharge on the temperature of the receiving water was modeled by simple mixing analysis at critical condition and a chronic dilution factor of 168:1. The average receiving water temperature at the critical condition is 12.13°C during October and the average effluent temperature is 18.85°C. The predicted resultant temperature at the boundary of the chronic mixing zone is 12.17°C and the incremental rise is 0.04°C.

Under critical conditions there is no predicted violation of the Water Quality Standards for Surface Waters. Therefore, no effluent limitation for temperature was placed in the proposed permit.

pH--Because of the high buffering capacity of marine water, compliance with the technology-based limits of 6 to 9 will assure compliance with the Water Quality Standards for Surface Waters.

Fecal coliform--The concentration of fecal coliform organisms at the edge of allowable mixing zones were modeled by simple mixing analysis using the technology based limit of 400 colonies per 100 mL, a chronic dilution factor of 168:1, and an ambient concentration of 3 colonies per 100 mL. This yields a concentration at the edge of the chronic mixing zone of 5.36 colonies per 100 mL.

Under critical conditions there is no predicted violation of the Water Quality Standards for Surface Waters with the technology-based limit. Therefore, the technology-based effluent limitation for fecal coliform bacteria was placed in the proposed permit.

Toxic Pollutants--Federal regulations (40 CFR 122.44) require NPDES permits to contain effluent limits for toxic chemicals in an effluent whenever there is a reasonable potential for those chemicals to exceed the surface water quality criteria. This process occurs concurrently with the derivation of technology-based effluent limits. Facilities with technology-based effluent limits defined in regulation are not exempted from meeting the Water Quality Standards for Surface Waters or from having surface water quality-based effluent limits.

The following toxics were determined to be present in the discharge: chlorine, ammonia, copper, lead, selenium, and zinc. A reasonable potential analysis (See Appendix C) was conducted on these parameters to determine whether or not effluent limitations would be required in this permit.

The determination of the reasonable potential for chlorine, ammonia, copper, lead, selenium, and zinc to exceed the water quality criteria was evaluated with procedures given in EPA, 1991 (Appendix C). The parameters used in the modeling are as follows: an acute dilution factor of 16.7:1, and a chronic dilution factor of 168:1.

At the present time the Chambers Creek WWTF is switching from chlorine to ultraviolet light for disinfection and will have chlorine as a backup for one year as a safe guard. It is not anticipated that any chlorine use will exceed the water quality criteria based on past residual concentrations and the contact time provided in the final tank and additional contact time in the length of the discharge pipe, therefore, no limit on chlorine was placed in the proposed permit.

The determination of the reasonable potential for total ammonia as  $\text{NH}_3\text{-N}$  to exceed the water quality criteria was evaluated with procedures given in EPA, 1991 (Appendix C) at the critical condition. The critical condition in this case occurs during August and September. The parameters used in the critical condition modeling are as follows: acute dilution factor 16.7, chronic dilution factor 168, receiving water temperature  $13.97^\circ\text{C}$ , receiving water pH 7.9 SU, receiving water salinity 27.94 ppt, receiving water  $\text{NH}_4\text{D}$  concentration 0.0285 mg/L 99<sup>th</sup> percentile and 0.026 mg/L 95<sup>th</sup> percentile. Under these critical conditions there was no predicted violation of the Surface Water Quality Standards for total ammonia as  $\text{NH}_3\text{-N}$ , therefore no limit on total ammonia as  $\text{NH}_3\text{-N}$  was placed in the proposed permit. The effluent will be subject to a bio monitoring program for toxics, and if ammonia is found to be a problem, corrective action will be required.

The determination of the reasonable potential for copper to exceed the water quality criteria was evaluated with procedures given in EPA, 1991 (Appendix C). The parameters used in the critical condition modeling are as follows: acute dilution factor 16.7, chronic dilution factor 168, highest effluent total copper concentration 22  $\mu\text{g/L}$ , effluent copper coefficient of variation 0.3596, and the number of effluent copper samples was 15. Although there is no valid ambient data for copper in the immediate area around the Chambers Creek WWTF outfall, nearby commencement bay copper values range from 0.24 $\mu\text{g/L}$  to 0.66  $\mu\text{g/L}$ . Using the commencement bay values there was no predicted violation of the Surface Water Quality Standards for copper. In order for there to be a reasonable potential for the Chambers Creek WWTF effluent to violate the water quality standards for copper the ambient copper concentrations would have to exceed 1.98  $\mu\text{g/L}$ . Since it is highly unlikely for the ambient copper concentrations in the area of the Chambers Creek outfall to greatly exceed those found in commencement bay no limit on copper was placed in the proposed permit.

The highest effluent value for lead was 2  $\mu\text{g/L}$  which is below the marine waters water quality standard of 199  $\mu\text{g/L}$  acute and 7.7  $\mu\text{g/L}$  chronic. Since the Chambers Creek effluent meets the marine water quality standard for lead at the end of pipe no limit on lead was placed in the proposed permit.

The highest effluent value for selenium was 2  $\mu\text{g/L}$  which is below the marine waters water quality standard of 289  $\mu\text{g/L}$  acute and 71  $\mu\text{g/L}$  chronic. Since the Chambers Creek effluent meets the marine

water quality standard for selenium in the effluent, prior to mixing, no limit on selenium was placed in the proposed permit.

The highest effluent value for zinc was 56 µg/L which is below the marine waters water quality standard of 85.14 µg/L acute and 76.2 µg/L chronic. Since the Chambers Creek effluent meets the marine water quality standard for zinc in the effluent, prior to mixing, no limit on zinc was placed in the proposed permit.

Water quality criteria for metals in Chapter 173-201A WAC are based on the dissolved fraction of the metal. The Permittee may provide data clearly demonstrating the seasonal partitioning of the dissolved metal in the ambient water in relation to an effluent discharge. Metals criteria may be adjusted on a site-specific basis when data is available clearly demonstrating the seasonal partitioning in the ambient water in relation to an effluent discharge.

#### WHOLE EFFLUENT TOXICITY

The Water Quality Standards for Surface Waters require that the effluent not cause toxic effects in the receiving waters. Many toxic pollutants cannot be detected by commonly available detection methods. However, toxicity can be measured directly by exposing living organisms to the wastewater in laboratory tests and measuring the response of the organisms. Toxicity tests measure the aggregate toxicity of the whole effluent, and therefore this approach is called whole effluent toxicity (WET) testing. Some WET tests measure acute toxicity and other WET tests measure chronic toxicity.

Acute toxicity tests measure mortality as the significant response to the toxicity of the effluent. Dischargers who monitor their wastewater with acute toxicity tests are providing an indication of the potential lethal effect of the effluent to organisms in the receiving environment.

Chronic toxicity tests measure various sublethal toxic responses such as retarded growth or reduced reproduction. Chronic toxicity tests often involve either a complete life cycle test of an organism with an extremely short life cycle or a partial life cycle test on a critical stage of one of a test organism's life cycles. Organism survival is also measured in some chronic toxicity tests.

Accredited WET testing laboratories have the proper WET testing protocols, data requirements, and reporting format. Accredited laboratories are knowledgeable about WET testing and capable of calculating an NOEC, LC<sub>50</sub>, EC<sub>50</sub>, IC<sub>25</sub>, etc. All accredited labs have been provided the most recent version of the Department of Ecology Publication # WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria* which is referenced in the permit. Any Permittee interested in receiving a copy of this publication may call the Department Publications Distribution Center 360-407-7472 for a copy. The Department recommends that Permittees send a copy of the acute or chronic toxicity sections(s) of their permits to their laboratory of choice.

Acute toxicity was measured during effluent characterization in the previous permit term. Acute toxicity was found to be at levels that, in accordance with WAC 173-205-050(2)(a), have a reasonable potential to cause receiving water toxicity. An acute toxicity limit is therefore required. The acute toxicity limit is no statistically significant difference in test organism survival between the acute critical effluent concentration (ACEC), 5.9 percent of the effluent, and the control.

The acute toxicity limit is set relative to the zone of acute criteria exceedance (acute mixing zone) established in accordance with WAC 173-201A-100. The acute critical effluent concentration (ACEC) is the concentration of effluent existing at the boundary of the acute mixing zone during critical conditions.

Monitoring for compliance with an acute toxicity limit is accomplished by conducting an acute toxicity test using a sample of effluent diluted to equal the ACEC and comparing test organism survival in the

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ACEC to survival in nontoxic control water. The Permittee is in compliance with the acute toxicity limit if there is no statistically significant difference in test organism survival between the ACEC and the control.

Chronic toxicity was measured in the previous permit term. This toxicity was found to be at levels that, in accordance with WAC 173-205-050(2)(a), have a reasonable potential to cause receiving water toxicity. The results of this WET testing cannot be used to characterize effluent toxicity or make the regulatory determination required in Chapter 173-205 WAC. In accordance with WAC 173-205-030(5)(b), the Permittee is required to conduct a effluent characterization for whole effluent toxicity.

#### HUMAN HEALTH

Washington's water quality standards now include 91 numeric health-based criteria that must be considered in NPDES permits. These criteria were promulgated for the state by the U.S. EPA in its National Toxics Rule (Federal Register, Volume 57, No. 246, Tuesday, December 22, 1992).

The Department has determined that the applicant's discharge does not contain chemicals of concern based on existing data or knowledge. The discharge will be re-evaluated for impacts to human health at the next permit reissuance.

#### SEDIMENT QUALITY

The Department has promulgated aquatic sediment standards (Chapter 173-204 WAC) to protect aquatic biota and human health. These standards state that the Department may require Permittees to evaluate the potential for the discharge to cause a violation of applicable standards (WAC 173-204-400).

The Department has determined through a review of the discharger characteristics and effluent characteristics that this discharge has no reasonable potential to violate the Sediment Management Standards.

#### GROUND WATER QUALITY LIMITATIONS

This Permittee has no discharge to ground and therefore no limitations are required based on potential effects to ground water.

#### COMPARISON OF EFFLUENT LIMITS WITH THE EXISTING PERMIT ISSUED March 28, 1990.

Existing Limits	Proposed Limits
CBOD <sub>5</sub> 25 mg/L 3,750 lbs/day 40 mg/L 6,005 lbs/day	CBOD <sub>5</sub> 25 mg/L 5,984 lbs/day 40 mg/L 9,574 lbs/day
TSS 30 mg/L 4,500 lbs/day 45 mg/L 6,760 lbs/day	TSS 30 mg/L 7,181 lbs/day 45 mg/L 10,771 lbs/day
F. Coliform 200/100 mL - 400/100 mL	F. Coliform 200/100 mL - 400/100 mL
pH 6.0 - 9.0	pH 6.0 - 9.0
	No acute toxicity detected in a test concentration representing the acute critical effluent concentration (ACEC).
	No chronic toxicity detected in a test



	concentration representing the chronic critical effluent concentration (CCEC). If any of the tests conducted for effluent characterization shows a significant difference between the control and the ACEC.
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## **MONITORING REQUIREMENTS**

Monitoring, recording, and reporting are required (WAC 173-220-210 and 40 CFR 122.41) to verify that the treatment process is functioning correctly and the effluent limitations are being achieved.

Reduced monitoring frequencies are allowed for demonstrated good performance and are based on the ratio of the long term effluent average to the average monthly limit. The permit writer's manual recommends that for an activated sludge plant with a flow greater than 5 MGD that CBOD<sub>5</sub> and TSS be monitored at least 5/week and Fecal Coliforms be monitored on a daily basis. The ratio of the LTA to AML of the Chambers Creek Effluent for the following parameters is: CBOD<sub>5</sub> – 42 percent; TSS – 46 percent; and Fecal Coliforms – 32 percent. Based on these ratios of LTA to AML the permit writers manual then allows a reduction for CBOD<sub>5</sub> and TSS from 5/week down to 2/week and for Fecal Coliforms from 7/week down to 3/week per Table XIII-1A1. These reductions in monitoring frequencies will be incorporated into the proposed permit.

Monitoring of sludge quantity and quality is necessary to determine the appropriate uses of the sludge. Sludge monitoring is required by the current state and local solid waste management program and also by EPA under 40 CFR 503.

The monitoring schedule is detailed in the proposed permit under Condition S.2. Specified monitoring frequencies take into account the quantity and variability of discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring. The required monitoring frequency is consistent with agency guidance given in the current version of the Department's *Permit Writer's Manual* (July 1994) for activated sludge secondary treatment.

As a pretreatment POTW, Pierce County is required to have influent, final effluent, and sludge sampled for toxic pollutants in order to characterize the industrial input. Sampling is also done to determine if pollutants interfere with the treatment process or pass through the plant to the sludge or the receiving water. The monitoring data will be used by Pierce County to develop local limits which commercial and industrial users must meet.

### **LAB ACCREDITATION**

With the exception of certain parameters the permit requires all monitoring data to be prepared by a laboratory registered or accredited under the provisions of Chapter 173-50 WAC, *Accreditation of Environmental Laboratories*. The laboratory at the Chambers Creek WWTF is accredited for the following parameters: Alkalinity, Ammonia, Biochemical Oxygen Demand, Carbonaceous Biochemical Oxygen Demand, Chemical Oxygen Demand, Chlorine Residual, Dissolved Oxygen, Hardness, Nitrate, Nitrate + Nitrite, Nitrite, Total Kjeldahl Nitrogen, Oil & Grease, Orthophosphate, pH, Total Persulfate Phosphorus, Salinity, Total Dissolved Solids, Total Suspended Solids, Total Volatile Solids, and Fecal Coliforms.

## **OTHER PERMIT CONDITIONS**

### *REPORTING AND RECORDKEEPING*

The conditions of S3 are based on the authority to specify any appropriate reporting and recordkeeping requirements to prevent and control waste discharges (WAC 173-220-210).

### *PREVENTION OF FACILITY OVERLOADING*

Overloading of the treatment plant is a violation of the terms and conditions of the permit. To prevent this from occurring, RCW 90.48.110 and WAC 173-220-150 require the Permittee to take the actions detailed in proposed permit requirement S.4 to plan expansions or modifications before existing capacity is reached and to report and correct conditions that could result in new or increased discharges of pollutants. Condition S.4 restricts the amount of flow.

### *OPERATION AND MAINTENANCE (O&M)*

The proposed permit contains Condition S.5 as authorized under RCW 90.48.110, WAC 173-220-150, Chapter 173-230 WAC, and WAC 173-240-080. It is included to ensure proper operation and regular maintenance of equipment, and to ensure that adequate safeguards are taken so that constructed facilities are used to their optimum potential in terms of pollutant capture and treatment.

### *RESIDUAL SOLIDS HANDLING*

To prevent water quality problems the Permittee is required in permit Condition S7 to store and handle all residual solids (grit, screenings, scum, sludge, and other solid waste) in accordance with the requirements of RCW 90.48.080 and State Water Quality Standards.

The final use and disposal of sewage sludge from this facility is regulated by U.S. EPA under 40 CFR 503. The disposal of other solid waste is under the jurisdiction of the Pierce County Health Department.

Requirements for monitoring sewage sludge and recordkeeping are included in this permit. This information will be used by the Department to develop or update local limits and is also required under 40 CFR 503.

### *PRETREATMENT*

To provide more direct and effective control of pollutants discharged, Pierce County has been delegated permitting, monitoring and enforcement authority for industrial users discharging to their treatment system. The Department oversees the delegated Industrial Pretreatment Program to assure compliance with federal pretreatment regulations (40 CFR Part 403) and categorical standards and state regulations (Chapter 90.48 RCW and Chapter 173-216 WAC).

### *SPILL PLAN*

The Department has determined that the Permittee stores a quantity of chemicals that have the potential to cause water pollution if accidentally released. The Department has the authority to require the Permittee to develop best management plans to prevent this accidental release under section 402(a)(1) of the Federal Water Pollution Control Act (FWPCA) and RCW 90.48.080.

*EFFLUENT MIXING STUDY*

The Department has estimated the amount of mixing of the discharge within the authorized mixing zone to determine the potential for violations of the Water Quality Standards for Surface Waters (Chapter 173-201A WAC). Condition S.8 of this permit requires the Permittee to more accurately determine the mixing characteristics of the discharge. Mixing will be measured or modeled under conditions specified in the permit to assess whether assumptions made about dilution will protect the receiving water quality outside the allotted dilution zone boundary.

*OUTFALL EVALUATION*

Proposed permit Condition S.11 requires the Permittee to conduct an outfall inspection and submit a report detailing the findings of that inspection. The purpose of the inspection is to determine the condition of the discharge pipe and diffusers and to determine if sediment is accumulating in the vicinity of the outfall.

*GENERAL CONDITIONS*

General Conditions are based directly on state and federal law and regulations and have been standardized for all individual municipal NPDES permits issued by the Department.

**PERMIT ISSUANCE PROCEDURES**

*PERMIT MODIFICATIONS*

The Department may modify this permit to impose numerical limitations, if necessary to meet Water Quality Standards, Sediment Quality Standards, or Ground Water Standards, based on new information obtained from sources such as inspections, effluent monitoring, outfall studies, and effluent mixing studies.

The Department may also modify this permit as a result of new or amended state or federal regulations.

*RECOMMENDATION FOR PERMIT ISSUANCE*

This proposed permit meets all statutory requirements for authorizing a wastewater discharge, including those limitations and conditions believed necessary to protect human health, aquatic life, and the beneficial uses of waters of the state of Washington. The Department proposes that this permit be issued for five years.

## **REFERENCES FOR TEXT AND APPENDICES**

### Environmental Protection Agency (EPA)

1992. National Toxics Rule. Federal Register, V. 57, No. 246, Tuesday, December 22, 1992.
1991. Technical Support Document for Water Quality-based Toxics Control. EPA/505/2-90-001.
1988. Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling. USEPA Office of Water, Washington, D.C.
1985. Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants in Surface and Ground Water. EPA/600/6-85/002a.
1983. Water Quality Standards Handbook. USEPA Office of Water, Washington, D.C.

### Metcalf and Eddy.

1991. Wastewater Engineering, Treatment, Disposal, and Reuse. Third Edition.

### Tsivoglou, E.C., and J.R. Wallace.

1972. Characterization of Stream Reaeration Capacity. EPA-R3-72-012. (Cited in EPA 1985 op.cit.)

### Washington State Department of Ecology.

1994. Permit Writer's Manual. Publication Number 92-109

### Water Pollution Control Federation.

1976. Chlorination of Wastewater.

### Wright, R.M., and A.J. McDonnell.

1979. In-stream Deoxygenation Rate Prediction. Journal Environmental Engineering Division, ASCE. 105(E2). (Cited in EPA 1985 op.cit.)

## **APPENDIX A--PUBLIC INVOLVEMENT INFORMATION**

The Department has tentatively determined to reissue a permit to the applicant listed on page 1 of this fact sheet. The permit contains conditions and effluent limitations which are described in the rest of this fact sheet.

Public notice of application was published on July 21, 2002, and July 26, 2002, in the *Tacoma News Tribune* to inform the public that an application had been submitted and to invite comment on the reissuance of this permit.

The Department will publish a Public Notice of Draft (PNOD) on \_\_\_\_\_, in the *Tacoma News Tribune* to inform the public that a draft permit and fact sheet are available for review. Interested persons are invited to submit written comments regarding the draft permit. The draft permit, fact sheet, and related documents are available for inspection and copying between the hours of 8:00 a.m. and 5:00 p.m. weekdays, by appointment, at the regional office listed below. Written comments should be mailed to:

Water Quality Permit Administrator  
Department of Ecology  
Southwest Regional Office  
P.O. Box 47775  
Olympia, WA 98504-7775.

Any interested party may comment on the draft permit or request a public hearing on this draft permit within the 30-day comment period to the address above. The request for a hearing shall indicate the interest of the party and the reasons why the hearing is warranted. The Department will hold a hearing if it determines there is a significant public interest in the draft permit (WAC 173-220-090). Public notice regarding any hearing will be circulated at least 30 days in advance of the hearing. People expressing an interest in this permit will be mailed an individual notice of hearing (WAC 173-220-100).

Comments should reference specific text followed by proposed modification or concern when possible. Comments may address technical issues, accuracy and completeness of information, the scope of the facility's proposed coverage, adequacy of environmental protection, permit conditions, or any other concern that would result from issuance of this permit.

The Department will consider all comments received within 30 days from the date of public notice of draft indicated above, in formulating a final determination to issue, revise, or deny the permit. The Department's response to all significant comments is available upon request and will be mailed directly to people expressing an interest in this permit.

Further information may be obtained from the Department by telephone, (360) 407-6275, or by writing to the address listed above.

This permit and fact sheet were written by Glenn Pieritz.

## **APPENDIX B--GLOSSARY**

**Acute Toxicity**--The lethal effect of a pollutant on an organism that occurs within a short period of time, usually 48 to 96 hours.

**AKART**-- An acronym for "all known, available, and reasonable methods of prevention, control, and treatment".

**Ambient Water Quality**--The existing environmental condition of the water in a receiving water body.

**Ammonia**--Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.

**Average Monthly Discharge Limitation** --The highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month (except in the case of fecal coliform). The daily discharge is calculated as the average measurement of the pollutant over the day.

**Average Weekly Discharge Limitation** -- The highest allowable average of daily discharges over a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week. The daily discharge is calculated as the average measurement of the pollutant over the day.

**Best Management Practices (BMPs)**--Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the State. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

**BOD<sub>5</sub>**--Determining the Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD<sub>5</sub> is used in modeling to measure the reduction of dissolved oxygen in a receiving water after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

**Bypass**--The intentional diversion of waste streams from any portion of a treatment facility.

**CBOD<sub>5</sub>** – The quantity of oxygen utilized by a mixed population of microorganisms acting on the nutrients in the sample in an aerobic oxidation for five days at a controlled temperature of 20 degrees Celcius, with an inhibitory agent added to prevent the oxidation of nitrogen compounds. The method for determining CBOD<sub>5</sub> is given in 40 CFR Part 136.

**Chlorine**--Chlorine is used to disinfect wastewaters of pathogens harmful to human health. It is also extremely toxic to aquatic life.

**Chronic Toxicity**--The effect of a pollutant on an organism over a relatively long time, often 1/10 of an organism's lifespan or more. Chronic toxicity can measure survival, reproduction or growth rates, or other parameters to measure the toxic effects of a compound or combination of compounds.

**Clean Water Act (CWA)**--The Federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, 97-117; USC 1251 et seq.

**Combined Sewer Overflow (CSO)**--The event during which excess combined sewage flow caused by inflow is discharged from a combined sewer, rather than conveyed to the sewage treatment plant because either the capacity of the treatment plant or the combined sewer is exceeded.

**Compliance Inspection - Without Sampling**--A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations.

**Compliance Inspection - With Sampling**--A site visit to accomplish the purpose of a Compliance Inspection - Without Sampling and as a minimum, sampling and analysis for all parameters with limits in the permit to ascertain compliance with those limits; and, for municipal facilities, sampling of influent to ascertain compliance with the percent removal requirement. Additional sampling may be conducted.

**Composite Sample**--A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing a minimum of four discrete samples. May be "time-composite"(collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots).

**Construction Activity**--Clearing, grading, excavation and any other activity which disturbs the surface of the land. Such activities may include road building, construction of residential houses, office buildings, or industrial buildings, and demolition activity.

**Continuous Monitoring** --Uninterrupted, unless otherwise noted in the permit.

**Critical Condition**--The time during which the combination of receiving water and waste discharge conditions have the highest potential for causing toxicity in the receiving water environment. This situation usually occurs when the flow within a water body is low, thus, its ability to dilute effluent is reduced.

**Dilution Factor**--A measure of the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. Expressed as the inverse of the effluent fraction e.g., a dilution factor of 10 means the effluent comprises 10% by volume and the receiving water 90%.

**Engineering Report**--A document which thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report shall contain the appropriate information required in WAC 173-240-060 or 173-240-130.

**Fecal Coliform Bacteria**--Fecal coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. The presence of high numbers of fecal coliform bacteria in a water body can indicate the recent release of untreated wastewater and/or the presence of animal feces.

**Grab Sample**--A single sample or measurement taken at a specific time or over as short period of time as is feasible.

**Industrial User**-- A discharger of wastewater to the sanitary sewer which is not sanitary wastewater or is not equivalent to sanitary wastewater in character.

**Industrial Wastewater**--Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business, from the development of any natural resource, or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated storm water and, also, leachate from solid waste facilities.

**Infiltration and Inflow (I/I)**--"Infiltration" means the addition of ground water into a sewer through joints, the sewer pipe material, cracks, and other defects. "Inflow" means the addition of precipitation-caused drainage from roof drains, yard drains, basement drains, street catch basins, etc., into a sewer.

**Interference** -- A discharge which, alone or in conjunction with a discharge or discharges from other sources, both:

Inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal and;

Therefore is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent State or local regulations): Section 405 of the Clean Water Act, the Solid Waste Disposal Act (SWDA) (including title II, more commonly referred to as the Resource Conservation and Recovery Act (RCRA), and including State regulations contained in any State sludge management plan prepared pursuant to subtitle D of the SWDA), sludge regulations appearing in 40 CFR Part 507, the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection, Research and Sanctuaries Act.

**Major Facility**--A facility discharging to surface water with an EPA rating score of > 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

**Maximum Daily Discharge Limitation**--The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. The daily discharge is calculated as the average measurement of the pollutant over the day.

**Method Detection Level (MDL)**--The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is above zero and is determined from analysis of a sample in a given matrix containing the analyte.

**Minor Facility**--A facility discharging to surface water with an EPA rating score of < 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

**Mixing Zone**--A volume that surrounds an effluent discharge within which water quality criteria may be exceeded. The area of the authorized mixing zone is specified in a facility's permit and follows procedures outlined in State regulations (Chapter 173-201A WAC).

**National Pollutant Discharge Elimination System (NPDES)**--The NPDES (Section 402 of the Clean Water Act) is the Federal wastewater permitting system for discharges to navigable waters of the United States. Many states, including the State of Washington, have been delegated the authority to issue these permits. NPDES permits issued by Washington State permit writers are joint NPDES/State permits issued under both State and Federal laws.

**Pass through** -- A discharge which exits the POTW into waters of the--State in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation), or which is a cause of a violation of State water quality standards.

**pH**--The pH of a liquid measures its acidity or alkalinity. A pH of 7 is defined as neutral, and large variations above or below this value are considered harmful to most aquatic life.



**Potential Significant Industrial User**--A potential significant industrial user is defined as an Industrial User which does not meet the criteria for a Significant Industrial User, but which discharges wastewater meeting one or more of the following criteria:

- a. Exceeds 0.5 % of treatment plant design capacity criteria and discharges <25,000 gallons per day or;
- b. Is a member of a group of similar industrial users which, taken together, have the potential to cause pass through or interference at the POTW (e.g. facilities which develop photographic film or paper, and car washes).

The Department may determine that a discharger initially classified as a potential significant industrial user should be managed as a significant industrial user.

**Quantitation Level (QL)**-- A calculated value five times the MDL (method detection level).

**Significant Industrial User (SIU)**--

- 1) All industrial users subject to Categorical Pretreatment Standards under 40 CFR 403.6 and 40 CFR Chapter I, Subchapter N and;
- 2) Any other industrial user that: discharges an average of 25,000 gallons per day or more of process wastewater to the POTW (excluding sanitary, noncontact cooling, and boiler blow-down wastewater); contributes a process wastestream that makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the Control Authority\* on the basis that the industrial user has a reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement (in accordance with 40 CFR 403.8(f)(6)).

Upon finding that the industrial user meeting the criteria in paragraph 2, above, has no reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement, the Control Authority\* may at any time, on its own initiative or in response to a petition received from an industrial user or POTW, and in accordance with 40 CFR 403.8(f)(6), determine that such industrial user is not a significant industrial user.

\*The term "Control Authority" refers to the Washington State Department of Ecology in the case of non-delegated POTWs or to the POTW in the case of delegated POTWs.

**State Waters**--Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, wetlands, and all other surface waters and watercourses within the jurisdiction of the state of Washington.

**Stormwater**--That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a storm water drainage system into a defined surface water body, or a constructed infiltration facility.

**Technology-based Effluent Limit**--A permit limit that is based on the ability of a treatment method to reduce the pollutant.

**Total Suspended Solids (TSS)**--Total suspended solids are the particulate materials in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

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**Upset**--An exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventative maintenance, or careless or improper operation.

**Water Quality-based Effluent Limit**--A limit on the concentration or mass of an effluent parameter that is intended to prevent the concentration of that parameter from exceeding its water quality criterion after it is discharged into a receiving water.

### **APPENDIX C--TECHNICAL CALCULATIONS**

Several of the Excel<sup>®</sup> spreadsheet tools used to evaluate a discharger's ability to meet Washington State water quality standards can be found on the Department's homepage at <http://www.wa.gov/ecology>.

**Calculation of seawater fraction of un-ionized ammonia  
from Hampson (1977). Un-ionized ammonia criteria for  
salt water are from EPA 440/5-88-004.**

**Based on Lotus File NH3SALT.WK1 Revised 19-Oct-93**

Notes: Chambers Creek WWTF Total Ammonia as NH<sub>3</sub>-N

INPUT	
1. Temperature (deg C): 90th-%tile	13.97
2. pH: 90th-%tile	7.90
3. Salinity (g/Kg): 10th-%tile	27.94
OUTPUT	
1. Pressure (atm; EPA criteria assumes 1 atm):	1.0
2. Molal Ionic Strength (not valid if >0.85):	0.573
3. pKa8 at 25 deg C (Whitfield model "B"):	9.311
4. Percent of Total Ammonia Present as Unionized:	1.674%
5. Unionized ammonia criteria (mg un-ionized NH <sub>3</sub> per liter) from EPA 440/5-88-004	
Acute:	0.233
Chronic:	0.035
6. Total Ammonia Criteria (mg/L as NH <sub>3</sub> )	
Acute:	13.92
Chronic:	2.09
7. Total Ammonia Criteria (mg/L as NH <sub>3</sub> -N)	
Acute:	11.44
Chronic:	1.72

**Determining the Requirement for Permit Limits Through a  
Reasonable Potential Determination to Violate Standards at  
the Edge of the Mixing Zone.  
Based on EPA/505/2-90-001**

**Notes: Chambers Creek WWTF Total Ammonia as NH3-N**

<b>INPUT</b>	
Confidence Level and Probability Basis:	<b>0.95</b>
Coefficient of Variation for the Effluent Concentration (CV) (0.6 or a calculated CV if there are more than 10 data points):	<b>0.396</b>
Number of Effluent Samples or Data Points (ND):	<b>66</b>
Highest Effluent Concentration or Value (HV):	<b>44.2</b>
Dilution Factors (1/{Effluent Volume Fraction}) or plumes model	
Acute Receiving Water Dilution Factor:	<b>16.7</b>
Chronic Receiving Water Dilution Factor:	<b>168</b>
Water Quality Standards (Concentration)	
Acute (one-hour) Criteria:	<b>11.44</b>
Chronic (n-day) Criteria:	<b>1.72</b>
Upstream Receiving Water Concentration:	
Upstream Concentration for Acute Condition (7Q10):	<b>0.0285</b>
Upstream Concentration for Chronic Condition (7Q10):	<b>0.0260</b>
MECB: 1-9 data points, highest value by 2; 10-50 the highest value; >50	
<b>OUTPUT</b>	
Percentile Represented by the Highest Concentration in Data Set ( $p_n = (1 - \text{confidence level})^{1/ND}$ )	0.955624827
Normal Distribution Value for 95th Percentile	1.644853476
Normal Distribution Value for 96th Percentile	1.70202646
$\sigma^2 = \ln(CV^2 + 1)$	0.145671404
$C95 = \exp(1.645\sigma - 0.5\sigma^2)$	1.741861315
$C96 = \exp(1.702\sigma - 0.5\sigma^2)$	1.780288504
Reasonable Potential Multiplier = $C95/C96$	1.0
Maximum Expected Concentration of Pollutant in Effluent (MEC):	43.24595142
Acute - Concentration of Pollutant at the Edge of the Mixing Zone (CP):	2.616371342
Chronic - Concentration of Pollutant at the Edge of the Mixing Zone (CP):	0.283261616
Reasonable Potential to Violate Acute Criteria at the Edge of the Mixing Zone	<b>NO</b>
Reasonable Potential to Violate Chronic Criteria at the Edge of the Mixing Zone	<b>NO</b>

**Determining the Requirement for Permit Limits Through a  
Reasonable Potential Determination to Violate Standards at  
the Edge of the Mixing Zone.  
Based on EPA/505/2-90-001**

Notes: Chambers Creek WWTF Copper

<b>INPUT</b>	
Confidence Level and Probability Basis:	<b>0.95</b>
Coefficient of Variation for the Effluent Concentration (CV) (0.6 or a calculated CV if there are more than 10 data points):	<b>0.3596</b>
Number of Effluent Samples or Data Points (ND):	<b>15</b>
Highest Effluent Concentration or Value (HV):	<b>22</b>
Dilution Factors (1/{Effluent Volume Fraction}) or plumes model	
Acute Receiving Water Dilution Factor:	<b>16.7</b>
Chronic Receiving Water Dilution Factor:	<b>168</b>
Water Quality Standards (Concentration)	
Acute (one-hour) Criteria:	<b>4.80</b>
Chronic (n-day) Criteria:	<b>3.10</b>
Upstream Receiving Water Concentration:	
Upstream Concentration for Acute Condition (7Q10):	<b>0.6600</b>
Upstream Concentration for Chronic Condition (7Q10):	<b>0.6600</b>
MECB: 1-9 data points, highest value by 2; 10-50 the highest value; >50	
<b>OUTPUT</b>	
Percentile Represented by the Highest Concentration in Data Set ( $p_n = (1 - \text{confidence level})^{1/ND}$ )	0.818963727
Normal Distribution Value for 95th Percentile	1.644853476
Normal Distribution Value for 82th Percentile	0.911422878
$\sigma^2 = \ln(CV^2 + 1)$	0.121608739
$C95 = \exp(1.645\sigma - 0.5\sigma^2)$	1.669954278
$C82 = \exp(0.911\sigma - 0.5\sigma^2)$	1.293085301
Reasonable Potential Multiplier = $C95/C82$	1.3
Maximum Expected Concentration of Pollutant in Effluent (MEC):	28.41188752
Acute - Concentration of Pollutant at the Edge of the Mixing Zone (CP):	2.321789672
Chronic - Concentration of Pollutant at the Edge of the Mixing Zone (CP):	0.825189807
Reasonable Potential to Violate Acute Criteria at the Edge of the Mixing Zone	<b>NO</b>
Reasonable Potential to Violate Chronic Criteria at the Edge of the Mixing Zone	<b>NO</b>

### Summary of Chamber Creek Outfall Evaluation from ReRating Investigation

#### Ambient Velocity Near Chamber Creek WWTP Outfall

	36.3-ft Velocity, cm/s	73.3-ft Velocity, cm/s
<i>Current Condition</i>		
Acute #1, (10 <sup>th</sup> Percentile)	3	1.5
Chronic, (50 <sup>th</sup> Percentile)	8.2	6.7
Acute #2, (90 <sup>th</sup> Percentile)	21.7	18.3

#### Summary of Mixing Zone Evaluation Critical Condition Criteria

PARAMETER	DESCRIPTION <sup>1</sup>		SOURCE
	ACUTE	CHRONIC	
Density Profile	Worst case of the max and min stratification- least mixing	Worst case of the max and min stratification- least mixing	1999 DOE/Evans-Hamilton Ambient Data
Current Velocity	Worst case of the 10 <sup>th</sup> and 90 <sup>th</sup> percentile velocity	50 <sup>th</sup> percentile velocity	1999 Evans-Hamilton Ambient Data
Critical Water Depth	Mean lower low water (MLLW)	Mean lower low water (MLLW)	NPDES Permit
Effluent Temperature	10 <sup>th</sup> percentile of wet weather flow time period=12.8°C	10 <sup>th</sup> percentile of wet weather flow time period=12.8°C	Plant Records
Mixing Zone Size	Ten percent of the chronic boundary 31-ft	Cylinder with a radius= 200 ft + MLLW and height=MLLW 310-ft	NPDES Permit
Plant Flow Rate	If flow rate $\leq$ 85% dry weather design flow, then use the highest daily max for last 3yrs. If flow rate > 85%, then use a peaking factor applied to dry weather design flow (existing and future).	If flow rate $\leq$ 85% dry weather design flow, then use highest monthly avg. If flow rate > 85%, then use dry weather design flow (existing and future).	Plant Records

<sup>1</sup> Source-DOE Permit Writer's Manual, July 1998.

#### Outfall Diffuser Input Parameters for PLUMES Model

CRITERIA	Value
Number of Ports	8
Port Spacing	16 feet

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Average Port Depth	110 feet MLLW
Port Diameter	0.99 feet
Vertical Discharge Angle	0 degrees
Port Contraction Coefficient	0.8 (bell shaped)
Port Elevation Above Bottom	8 feet

The diffusion port coefficient used in the PLUMES model was 0.0003 based on a study of similar outfall diffusers, performed by Baumgartner, Frick, Roberts, and Bodeen, in June 1993. The model is configured such that all ports are assumed to discharge on the same side of the diffuser.

Acute and chronic dilution factors were determined by varying the treatment plant peak monthly flow rate from 7 to 27 mgd. Peak monthly flow rate of 27 mgd and peak daily flow rate of 43 mgd was used for dilution factors comparisons. The following table summarizes the critical conditions, parameters used, and dilution factors for a peak month flow rate of 27 mgd.

**Summary of Critical Conditions**

PARAMETER	DESCRIPTION	
	ACUTE	CHRONIC
Density Profile	DOE Station GOR001 July Density Data	DOE Station GOR001 August Density Data
Current Velocity	10 <sup>th</sup> percentile	50 <sup>th</sup> percentile
Critical Water Depth	110 feet	110 feet
Effluent Temperature	12.8 °C	12.8 °C
Mixing Zone Size	A cylinder with a radius of 31 feet	A cylinder with a radius of 310 feet
Plant Flow Rate	Peak daily flow ranging from 11mgd to 43 mgd	Peak monthly flow ranging from 7mgd to 27 mgd

**Dilution Factors for Peak Month Effluent Flow Rate of 27 mgd**

**(Peak Day Flow Rate of 43 mgd).**

Trials	Number of 11.9-in Diameter Ports	Density Profile	Velocity-36.3 ft	Velocity-73.3 ft	Acute Dilution Factor <sup>1</sup>	Chronic Dilution Factor <sup>1</sup>
1	8	DOE-July Density	3	1.5	16.7	-



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2	8	DOE-August Density	8.2	6.7	-	168
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<sup>1</sup> Based on critical conditions for each mixing zone boundary as provided above.  
At a peak month effluent flow rate of 27 mgd (peak day flow of 43 mgd), the acute and chronic dilution zone factors are 16.7 and 168, for the acute and chronic zones respectively.

## **APPENDIX D--RESPONSE TO COMMENTS**

This response to comments (RTC) is an appendix to the fact sheet for the above referenced National Pollutant Discharge Elimination System (NPDES) permit. The RTC summarizes comments received during the 30-day public notice and comment period on the draft permit, and provides the Department's response. All changes to the draft permit are noted below. The Department has determined to issue this permit as revised.

Comments were received from Department of Health (DOH) and Pierce County Public Utilities.

### **Department of Health (DOH) Comments:**

1. **Comment:**

Fecal coliform testing frequency should be increased rather than reduced at the Chambers Creek WWTP. Flows to this facility have been steadily increasing over the past years, and Pierce County intends to direct more flows to the plant under its regional plan in the near future. The NPDES permit issued for this plant in 1990 required fecal coliform testing five days each week. However the draft permit has reduced this testing to only three days each week. My copy of the Ecology Permit Writers Manual recommends (minimum monitoring) daily (seven days per week) testing of fecal coliforms for activated sludge plants with greater than 5.0 mgd average design flow. The average daily design flow listed 12 years ago in their permit is 18.0 mgd. Therefore, the fecal coliform testing frequency at that time should have been seven days each week. Given the significant increase in plant flows, and the relatively short distance from this plant's outfall to harvestable shellfish resources, we recommend that the fecal coliform testing frequency be increased to seven days each week (rather than reduced to three). The increased fecal coliform testing frequency will be especially useful for monitoring the effectiveness of their UV disinfection system. You can read more details of the potential impact of this discharge on nearby shellfish resources in my evaluation report of this facility in April 1999. Thank you very much for your consideration of this recommendation.

**Response:**

The Chambers Creek WWTF was eligible for a reduction in frequency for fecal coliform testing due to the ratio of their monthly average effluent concentration to their average monthly permit limit. However, in light of the Department of Health's concern over shellfish beds in the area and a new ultraviolet disinfection system for the Chambers Creek WWTF the frequency for fecal coliform testing will be set at five times per week for the next permit term.

### **Pierce County Public Works and Utilities Comments:**

2. **Comment:**

S2A. Monitoring Schedule, pages 7 and 8. Most of the parameters in this section have reduced monitoring schedules based on the compliance history of the Chambers Creek WWTP. The draft permit proposes daily monitoring for temperature, pH and dissolved oxygen. The County proposes to have these parameters reduced to the same frequency as effluent CBOD and Suspended Solids monitoring. There have been no exceedances of the pH effluent limitations for Chambers Creek and no concerns raised related to the temperature and dissolved oxygen data.

**Response:**

The Department acknowledges the exemplary compliance history of the Chambers Creek WWTF. The Department looks at compliance history when determining testing frequencies for parameters such as BOD<sub>5</sub>, TSS, Ammonia-N, and Fecal Coliform. The Department has not applied reduced monitoring based on compliance history to parameters such as temperature, pH, and dissolved oxygen. No change to permit.

3. **Comment:**

Effluent Mixing Study – The County completed an effluent mixing ration study in 1994. While the County has a valid study that could be adapted to provide mixing rations for increasing flows, the County is in agreement with this extra effort to update the mixing ratio study.

**Response:**

Comment noted.

4. **Comment:**

Chronic toxicity effluent characterization – The County has previously conducted chronic toxicity effluent characterization for the Chambers Creek WWTF. The County is in agreement with this additional effort to update the characterization with marine organisms.

**Response:**

Comment noted.

5. **Comment:**

Page 5, Industrial discharges – Pierce Power decommissioned their facility and terminated all operations on September 27, 2002. This discharger should be removed from the fact sheet.

Frederickson Power generates electrical power through combustion turbines with a steam recovery process subject to categorical industry standards. This SIU took over the site and assumed the permit of the former Tenaska generating facility.

**Response:**

The fact sheet will be updated to reflect the above changes.

6. **Comment:**

The announcement of availability of draft permit refers to the City in the tentative determinations section. This should refer to Pierce County.

**Response:**

The announcement for copies of the draft permit will refer to the County rather than the City in future announcements.